CLAIMS

1. A complex hydride film characterized by comprising a light element complex hydride film with a homogeneous phase of a nano structure, the light element complex hydride composes of a lightweight metal having a low melting point, elemental hydrogen, and one or more elements selected from among nitrogen, carbon, boron, and aluminum.

2. The complex hydride film according to Claim 1, wherein the film has on a substrate a thin film with a nano structure composing of lightweight metal having a low melting point and one or more elements selected from among nitrogen, carbon, boron, and aluminum, and said thin film comprises a hydrogenated homogeneous phase of the complex hydride.

3. The complex hydride film according to Claim 1, wherein the lightweight metal having a low melting point is one or more metals selected from among alkali metals and alkaline earth metals.

4. The complex hydride film according to Claim 3, wherein the alkali metal or alkaline earth metal is one or more metals selected from lithium, sodium, magnesium, potassium, and calcium.

5. The complex hydride film according to Claim 1, wherein the film thickness is from 10 to 500 μm.

6. The complex hydride film according to Claim 1, wherein the complex hydride film comprises a complex hydride of $LiNH_2$, $LiBH_4$, $LiCH_3$, $Mg(NH_2)_2$, or $Mg(AlH_4)_2$.

7. A hydrogen storage material, comprising the complex hydride film as defined in any of Claims 1 to 6.

8. A method for manufacturing a complex hydride film characterized by comprising the steps of:

(1) forming on a substrate a thin film having a nano structure composing of a lightweight metal having a low melting point, and nitrogen, carbon, boron, or aluminum, by vapor deposition in a prescribed reaction vessel, using the elements as the raw materials;

(2) introducing hydrogen gas into the reaction system to hydrogenate the thin film; and

(3) synthesizing a light element complex hydride thin film composed of a homogeneous phase by the above steps, in a method for manufacturing the light element complex hydride.

9. The method for manufacturing a complex hydride film according to Claim 8, wherein a lightweight metal having a low

melting point and one or more elements selected from among nitrogen, carbon, boron, and aluminum are heated and evaporated to form a thin film having a nano structure of the elements on a substrate.

10. The method for manufacturing a complex hydride film according to Claim 8, wherein a lightweight metal having a low melting point is vapor deposited on a substrate in an atmosphere containing a prescribed amount of one or more elements selected from among nitrogen, carbon, boron, and aluminum, and thereby a thin film having a nano structure containing the elements is formed on the substrate.

11. The method for manufacturing a complex hydride film according to any of Claims 8 to 10, wherein hydrogen gas is introduced into the reaction system during or after the formation of the thin film, and thereby the thin film is hydrogenated.

12. The method for manufacturing a complex hydride film according to any of Claims 8 to 10, wherein the lightweight metal having a low melting point is one or more metals selected from among alkali metals and alkaline earth metals.

13. The method for manufacturing a complex hydride film according to Claim 12, wherein the alkali metal or alkaline

earth metal is one or more metals selected from lithium, sodium, magnesium, potassium, and calcium.

14. The method for manufacturing a complex hydride film according to any of Claims 8 to 10, wherein the lightweight metal having a low melting point is vaporized by vacuum heating, sputtering, ion plating, or laser ablation, and thereby a thin film having a nano structure is formed on a substrate.

15. The method for manufacturing a complex hydride film according to any of Claims 8 to 10, wherein the thin film is formed at a temperature of from 300 to 800°C.

16. The method for manufacturing a complex hydride film according to Claim 8 or 11, wherein the thin film and the hydrogen gas are brought into contact at a temperature of from 100 to 800°C.